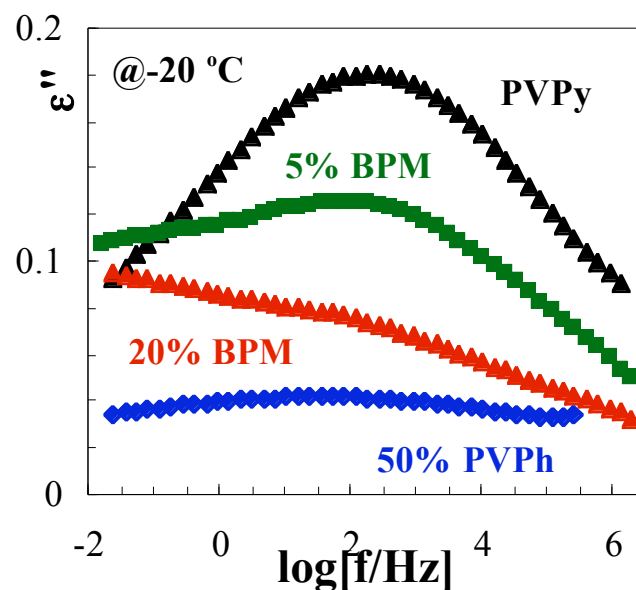


# Structure and Dynamics of Polymer Blends Exhibiting Strong Intermolecular Interactions

James Runt, Penn State University, DMR-0211056

Many applications are realized through molecular motions: e.g., diffusion of drug molecules or ions is generally coordinated with the segmental relaxation of the host macromolecule. The goal of this research program is to develop a fundamental understanding of the role of intermolecular associations (particularly hydrogen bonds) on segmental and local dynamics of polymer blends and solutions. We recently demonstrated that the extent of perturbation of the local dynamics is dependent upon the strength of the intermolecular hydrogen bonding between species participating in the local motions.

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Normalized dielectric loss spectra at  $-20\text{ }^\circ\text{C}$  of the local ( $\beta$ ) process of poly(2-vinyl pyridine [PVPy], two solutions of PVPy with the small molecule BPM (5% and 20% BPM) and a 50/50 complex of PVPy with poly(*p*-vinyl phenol)

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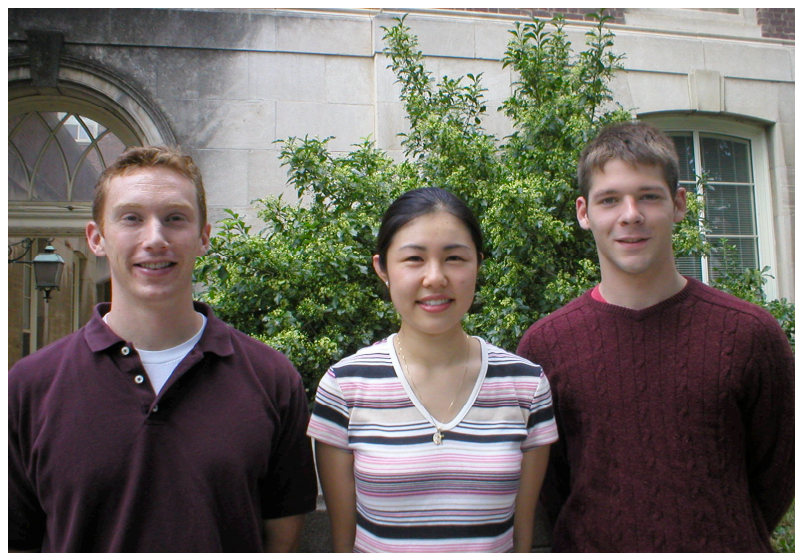
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## Education and Outreach:

During the past year, two students have completed their Ph.D. degrees: Dr. Shihai Zhang (now a post-doc at Penn State in EE) and Dr. Xing Jin (post-doc, University of California, Davis). Dr. Zhang was selected as the recipient of the 2003/04 Materials Research Award for Best Ph.D. Thesis in materials research at Penn State.

Two new Ph.D. students joined the project this academic year: Robert Klein and Benjamin Osmun. In addition, funds from the grant have been used to assist in a sabbatical stay at Penn State by Prof. Peggy Cebe (Tufts, Physics)

In addition, two Penn State undergraduates have actively participated in the program: Ms. Jessie Qian (Bio E) and Justin Horvath (Chem E -- now at Merck).



Three of the graduate students currently working with the PI are pictured above [left to right]: Rob Klein (B.S. MatSE, UCSB); Elena Hung (B.S. Chem, Princeton); Ben Osmun (B.S. Chem E, Penn State)